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# RHODES GRASS

**FARMERS' BULLETIN 1048**

**UNITED STATES DEPARTMENT OF AGRICULTURE**

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**R**HODES GRASS was introduced from southern Africa in 1902, and has proved of value for cultivation in the warmer parts of the United States, being grown more largely in Florida and Texas than elsewhere.

Rhodes grass bears drought well, but is liable to be winterkilled where the temperature falls below 15° F.

For its best growth the grass needs a soil which is fairly moist. It does well in nearly all of Florida, along the Gulf coast westward, and under irrigation in southern Texas. It does better on a soil which is fairly heavy than on one which is very light and sandy.

It makes a heavy yield of hay of excellent quality, as the stems are slender, tender, and very leafy. The hay is cured easily and is relished by all kinds of live stock.

In pastures under favorable circumstances Rhodes grass will support about two steers per acre for 9 or 10 months and double that number during the more favorable part of the season.

Seed is produced freely, although most of that now used in this country is imported from Australia on account of the lack of machinery in this country for thrashing and cleaning it.

This bulletin mentions the soil preferences of this grass and gives the methods of seeding and after-treatment employed as well as handling the hay and pasturing and seed saving.

Contribution from the Bureau of Plant Industry

WM. A. TAYLOR, Chief

Washington, D. C.

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# RHODES GRASS.

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## CHARACTERISTICS OF RHODES GRASS.

**R**HODES GRASS<sup>1</sup> is a perennial with very leafy, slender, erect stems 3 to 5 feet tall and very long and narrow leaves. It seeds freely at the tops of the stems in clusters of 10 to 20 spikes 3 to 4 inches long. In addition to the erect seed-bearing stems, it produces numerous prostrate runners, which are often 6 to 8 feet in length and take root at every joint where they rest on the ground, so that even where the original stand is thin these runners soon cover vacant spaces of considerable size. They serve not only to spread the grass, but also to establish a constant succession of new plants, more vigorous and productive than those which are older. Although the grass seeds freely and also spreads by runners, it is easily controlled and rarely becomes troublesome as a weed. (Fig. 1.)

## HISTORY.

Rhodes grass is a native of southern Africa, where it was first brought to notice by the late Cecil Rhodes and so became known by his name. The first agricultural publication in regard to it was an article in the *Agricultural Journal of Cape Colony* for October, 1902, giving directions for sowing seed of "the one known locally as Rhodes grass."

Rhodes grass was first introduced into this country in 1902, seed being sent to the United States Department of Agriculture by Mr. Hutchins, of the department of agriculture of Cape Colony, who then wrote of it—

As forage grasses, the only one cultivated here to any extent is the so-called Rhodes grass, or *Chloris gayana*. It was introduced by Mr. Rhodes into this part of the colony and has been successfully planted in his estate on the slopes of Table Mountain, but it does not stand dry situations.

In the following year (1903) Dr. David Fairchild, Agricultural Explorer of the Bureau of Plant Industry, Department of Agriculture, who was then in Africa, sent in 30 pounds of the seed, with the following statement:

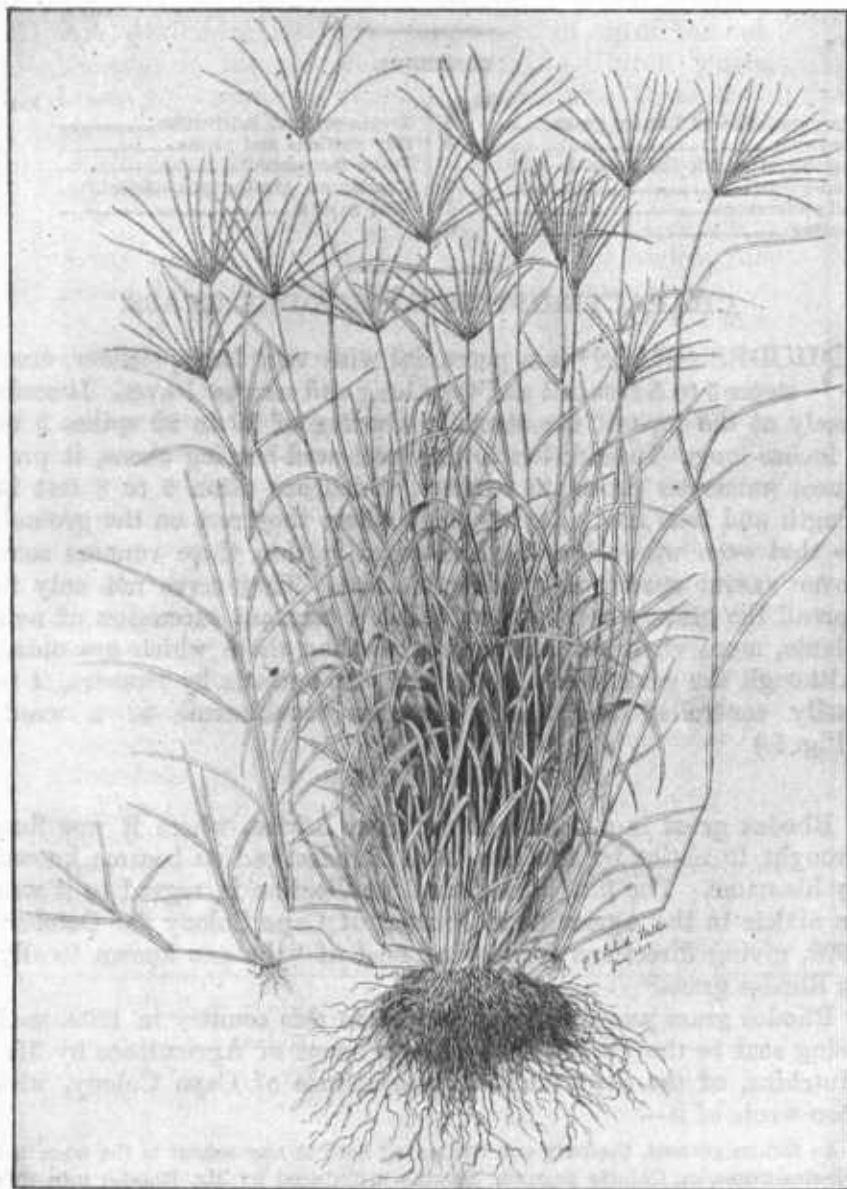


FIG. 1.—A plant of Rhodes grass, showing the running prostrate stems, some of which have already formed roots.

At Groot Schur, Mr. Cecil Rhodes's estate near Cape Town, there are several large fields of a species of Chloris [*C. gayana*] grown from seed which Mr. Rhodes had collected in the eastern Provinces of Cape Colony some years ago. Although, according to Prof. McOwan, the plant occurs commonly in the subtropical zone in other continents, from the fact that it was first brought into culture in South Africa by so noted a man as Mr. Rhodes, it has been given the name of Rhodes grass.

At about the same time, or probably a little earlier, Rhodes grass was introduced into Australia, where it proved so successful that it is from that country that we now import nearly all the seed used here. A small shipment was made from Australia to Florida in 1904.

The first distribution of this grass by the United States Department of Agriculture was in 1904, and as very little seed was then available, many of the earlier distributions were of roots, of which a few were sent to many farmers in Florida and along the Gulf coast westward to Texas. After a few years of trial the grass showed such great value for cultivation in those regions that a considerable quantity of the seed was procured from Australia, and in 1912 distributions were made in sufficient bulk for practical field plantings. Since then the grass has acquired such a reputation that the seed is now handled commercially by most southern seedsmen.

#### REGIONS TO WHICH THE GRASS IS BEST ADAPTED.

Owing to its inability to withstand severe cold, Rhodes grass is not grown extensively north of Florida, the immediate Gulf coast, and southern Texas. In Florida it is grown principally from St. Augustine southward along the east coast, from Brooksville southward along the west coast, and in a good part of the Everglades region. It grows well in southern California, although the acreage there is not large, as alfalfa and other hay crops are better suited to the present farm practices in that region. Heavy yields of it have been obtained about Yuma, and the Arizona Agricultural Experiment Station reports that it has a high value in the Tucson region. Probably more than half the total acreage in this country at the present time is in Texas, from Houston and San Antonio southward to the Rio Grande, and there it has become almost the universal practice to have one or more acres of it for a feed and pasture lot near the stable on every farm and ranch. It rarely survives the winter where the temperature falls below 15° or 18° F., and on that account it is sometimes grown as an annual in regions of colder winters, as it will then give two or three cuttings of about 1 ton each during the summer and fall; but at the present price of seed that is seldom profitable. The accompanying map shows the regions in which it can be grown most successfully. (Fig. 2.)

## SOIL PREFERENCES.

In this country Rhodes grass does best on a soil which is fairly moist, although it will live and make some growth during several months of drought. A deep, rich loam is best suited to its growth, and it is likely to be unsatisfactory on dry, hard clay, or on dry sandy soils. It grows vigorously on the well-drained peaty soils of Florida, on the "reclaimed" peaty soils of southern Louisiana, on the heavy irrigated lands of southern Texas, and on the black-wax soils wherever there is a moderate amount of rainfall or where irrigation is available. It grows well also on soils which are too alkaline for alfalfa, sugar cane, cotton, and many other crops, and so can be grown where the irrigation water is somewhat alkaline, as in many parts of the Southwest.

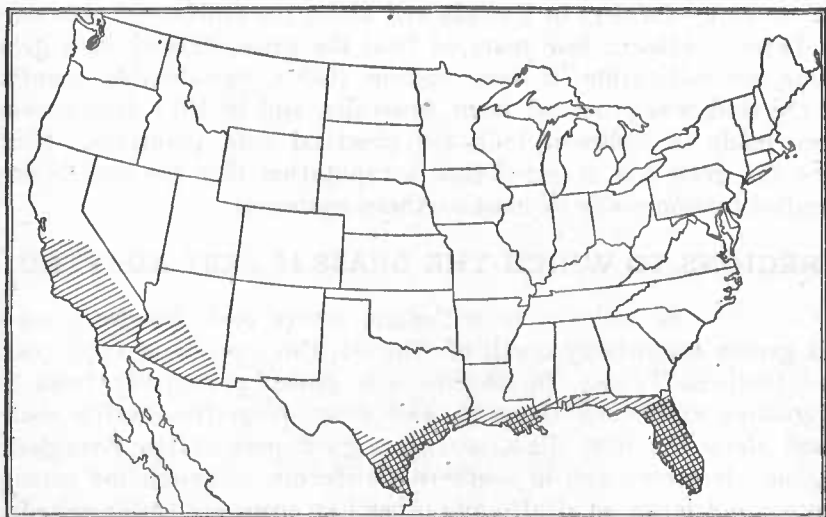


FIG. 2.—Map of the United States, the lined portions showing the areas where Rhodes grass may be grown and the checked portions where it is grown most largely at the present time.

## SEEDING.

The seeds of Rhodes grass are very small and light; therefore the ground on which they are sown should be well prepared. In Florida and in other sections where the rainfall is abundant, an excellent preparation is the growing of a crop of velvet beans or some other smothering crop which will kill out Bermuda grass and other troublesome weeds the previous year.

## PREPARATION OF THE SOIL.

As early in the spring as the soil is in a proper condition and there is no further danger from late frosts, or in late summer, the

ground should be well plowed and then harrowed until the surface is fine and even. All holes and low places should be filled, so that water can not stand anywhere on the field, and all humps should be smoothed off, so the mowing machine and rake can be used without trouble. This thorough smoothing of the surface is always essential to the making of a good meadow of any grass, as it can not be done after the seed is sown. In dry regions, like southern Texas, thorough preparation before seeding is especially important, as in most cases the fields must be irrigated. Careful plowing with repeated harrowings and diskings should be given to fine the surface, and the ground should be so well graded that uniform irrigation will be possible. Where the soil is very dry it is best to irrigate before plowing, so that the surface can be more easily and more thoroughly fined and a good supply of moisture secured in the soil before the seed is sown.

Too much stress can not be put on the importance of thorough preparation. As the seed is low in germination at best and the young plants are weak until they become well rooted, it is poor economy to risk the securing of a full stand by withholding a little work in preparing the field. The most successful growers in Texas recommend that the ground be prepared by irrigating, plowing, double disking, harrowing, seeding, rolling, and then irrigating. Florida growers, who are not obliged to irrigate, recommend plowing, harrowing, smoothing with a plank drag, seeding, and then rolling the heavier soils or using a weighted plank drag on those which are more sandy. The important point in seeding anywhere is to have the soil sufficiently moist to germinate the seed quickly, and then to maintain this moisture until the young plants become well established.

#### TIME AND MANNER OF SOWING.

While seeding may be done at any time during warm weather, early spring is usually preferred. The young plants are rather tender and are easily injured by either frost or drought. Summer seeding is often successful, but weeds are more troublesome than in the spring, and the moisture conditions are usually less favorable. October seedings often give good results, but the stand is liable to be injured by early frosts, and little is gained over waiting until the following spring. March and April are the favorite months for seeding in both Florida and Texas.

The seed is usually sown broadcast, the work being done on a still day so that the wind will not interfere with an even distribution. When sown by hand it is better to use only half the seed at the first sowing and the other half in going over the field at right angles to the direction in which the first half was sown; in that way there will be very few balks and skips. A wheelbarrow seeder is often used and



does satisfactory work when the seed is clean, but home-grown uncleaned seed often clogs the seeder and leaves bare spots. Many Texas growers prefer seeding with a press drill.

#### QUANTITY OF SEED NEEDED.

The quantity of seed needed varies with its quality and with the condition of the land. When the land is in good condition and well-cleaned seed is used, from 7 to 8 pounds per acre are sufficient, and some planters use much less. From 2 to 3 pounds are sufficient where a press drill is used on well-prepared soil. Most of the seed is low in germination, and one can not afford to be saving on seed at the cost of a full stand of the grass. Most of the home-grown seed is gathered up from about baling presses and stack yards and contains a large proportion of immature seed, chaff, and stems; it therefore should be used much more liberally, from 15 to 20 pounds per acre being much safer than a smaller quantity. The cleaner and more mature the seed, the less is needed.

#### COVERING THE SEED AND IRRIGATING THE GROUND.

After the seed is sown it should be covered very lightly. In regions of abundant rainfall a light harrowing or covering with a plank drag is usually sufficient, although if that is followed by a rolling it will be better. In Texas and other dry regions the use of the roller is much more important, as it is necessary to compact the surface of the soil so as to conserve all the moisture possible. If the soil is not fairly moist when the seed is sown, it should be irrigated immediately. The seeds germinate rather slowly, and the young plants are so weak that they should not be allowed to suffer from lack of moisture before they have become well established. If there should be no rain soon after the first irrigation, a second irrigation should be given before the soil becomes very dry, or in the course of two or three weeks. Maintaining a fair supply of moisture in the soil until the plants have developed strong roots should never be neglected, as a full stand of the grass is never secured when the soil becomes too dry soon after seeding.

Sometimes when the seeding is done in dry weather and rains fail to come as expected or it is impossible to secure water for irrigation the seed may lie in the ground for some weeks or even months without germinating and then make a fair stand; but such results are very uncertain, and the stand is never so good as when the seed is germinated quickly after sowing. While the seeds may retain their vitality for a considerable time in a soil that is thoroughly dry when they are sown, if there should be sufficient moisture to induce any

sprouting, it is absolutely necessary that this moisture supply be maintained for some weeks or the seed will die. After the plants are 6 or 8 weeks old, the constant moisture supply is much less necessary.

Under favorable conditions the crop is often grazed in a month after seeding, and frequently it will give a fair cutting for hay in two months, though the first cutting is likely to be somewhat weedy.

Attempts to grow the grass without irrigation in regions of very light rainfall have been uncertain in results. A few such plantings in the vicinity of Kingsville, Beeville, and Victoria, Tex., have been very successful, while many others have been complete failures. All the successful sowings have been made soon after rains had so filled the soil with moisture that it remained moist until the seed had time to germinate and the young plants became well established. Under such conditions the grass has done well, and in some cases has made heavy yields; but when sown on dry soils and the sowing was not followed soon by good rains, almost uniform failure has resulted.

### TREATMENT AND CULTIVATION.

If the field is free from weeds after the young grass becomes well established, it will need no special attention until ready to cut or graze; but when sown on old fields where the soil contains many weed seeds, it should be mowed as soon as the weeds reach a foot in height; some fields may even need a second mowing before the weeds are permanently checked by the growth of the grass. When the field is once free from weeds, there is little danger of their reappearance.

When grown on a fairly rich soil, fertilizers are seldom needed, but when on soils containing little humus, nitrogenous fertilizers have proved highly beneficial. Stable manure is, of course, the best fertilizer and should be used whenever it can be secured in sufficient quantity, but when it is not available nitrate of soda, cottonseed meal, or any other nitrogenous fertilizer may be used. Fields which are in need of fertilizing usually become sod bound and the surface very hard and compact, so that neither rain nor irrigation water is absorbed freely. Under such circumstances, the best method of using the fertilizer is to apply it broadcast and then loosen the surface of the ground by a thorough disking followed by a harrowing, which will work the fertilizer into the soil and leave the surface smooth. In dry regions this should be followed immediately by an irrigation, which will make the fertilizer more quickly available and also help to smooth and compact the surface. Many fields are greatly benefited by a disking once in every two or three years, even when no fertilizer is applied, and if a field has become seriously sod bound, it

is often made as productive as at first by plowing broadcast and then harrowing thoroughly. Such treatment in dry regions should be followed immediately by an irrigation; in humid regions it should be given early in the spring.

When well established the grass will live a long time without water but will make little growth, and after water is applied it will grow rapidly and be ready to cut in about 30 days.

### HAY CUTTINGS AND YIELDS.

The yield of hay varies greatly with the character of the soil and the length of the growing season, and still more with the amount of moisture in the soil. When it is grown on thin sandy or clay soil with only a moderate amount of rainfall or with insufficient irrigation, the yield may be only 1 or 2 tons per acre, while on the soils best suited to its growth and well supplied with moisture the yields are often 8 tons or more.

Cuttings should be made as soon as the seeds begin to ripen, and in arid regions each cutting should be followed immediately by an irrigation, so as to secure a new growth as quickly as possible. Little new growth is made after cutting until the soil is well moistened. From three to six cuttings usually can be made during a year, about five weeks being sufficient for the growth of a hay crop when all conditions are favorable. Some growers have made as many as nine cuttings in a year, but that practice is not generally favored, as it weakens the plants so much that the yield is smaller the following year. Most growers think it better to make three to five cuttings during the summer, and then graze the field during the winter. Those who cut the grass early, as soon as the seeds begin to ripen, get about 1 ton from each of five cuttings, while those who cut later may get 5 to 7 tons from three cuttings, but the earlier cuttings make the better hay. The first cuttings usually can be made about April 1 and the last about November 1, but the dates vary with the locality and the season. The last cutting should be made three or four weeks before frost is expected, as there will then be much less danger of winterkilling.

### CUTTING THE GRASS AND CURING THE HAY.

As the grass is very leafy and the stems are slender the hay is easily cured. In a dry climate, like that of Texas, it is a common practice to cut in the morning, windrow in the afternoon, cock the next day, and allow the hay to stand in the cocks two or three days, when it is ready for baling. Some let it lie in the windrow two or three days and then stack or bale without cocking. In a more moist climate, like that of Florida, more time must be given to the curing, and it is a common practice to windrow the second day, after the dew has

disappeared, allow the hay to stand in cocks for two or three days, and then stack it, so that the curing will be still more thorough before it is baled.

It is highly desirable that the curing be done as rapidly as possible, since long exposure to sunshine bleaches the hay and makes it less attractive in appearance.

#### QUALITY OF THE HAY.

The quality of hay made from Rhodes grass is superior to that of hay made from most other grasses in that it contains a larger proportion of leaves, while the stems are slender, tender, and sweet, so that the hay is eaten with very little waste. Horses, mules, and cattle eat it with great relish. It retains its color well in drying, therefore making an attractive-looking bale for the market.

The chemical analyses of Rhodes-grass hay vary with the age of the grass at the time the sample is taken, with the season, the soil on which it is grown, and other factors, but the following are fair samples of several analyses.

*Analyses of Rhodes-grass hay grown in Virginia and Mississippi.<sup>1</sup>*

Constituents.	Grass grown at—	
	Arlington Farm, Va.	Biloxi, Miss.
Moisture.....per cent..	4.85	4.87
Ash.....do...	7.83	3.82
Ether extract.....do...	1.20	1.29
Protein.....do...	10.59	4.75
Crude fiber.....do...	34.35	39.50
Nitrogen-free extract.....do...	41.18	45.77

<sup>1</sup> Analyses made by Bureau of Chemistry, United States Department of Agriculture.

Rhodes grass is of such recent introduction that no accurate feeding or digestion tests have been made, but those who have used the hay claim that its fattening and staying qualities are excellent.

#### VALUE FOR PASTURE.

Rhodes grass was first cultivated on account of its value for pasture. It bears trampling well, recovers quickly after it is eaten down, and is relished by all kinds of live stock. In regions where the grass can be grown, the grazing season lasts through the entire year, though, of course, the quantity of feed produced is much less in cool weather than during the summer.

The carrying capacity of pastures varies greatly with the soils and seasons, but is much greater than that of any other pasture in the same region. One pasture which was inspected in Texas had grazed four steers per acre for eight months with a prospect of considerable

grazing during the remainder of the year. Another field had grazed three steers per acre for 10 months, and was still giving fair grazing in December. Another field of 32 acres had carried 48 cattle, 6 mules, and 2 horses from January 1 to July 11, and the grass was then growing more rapidly than it was eaten. Another field of 3 acres had carried 2 cows, 4 mules, 1 horse, and 64 hogs from March 1 to July 11. During that time one cutting had been made for hay, and it would have yielded fully half a ton per acre when it was inspected in July. One field was seen which had been grazed constantly for five years, carrying an average of about three steers per acre, and at the end of that time it was still in good condition.

### CONTINUOUS GRAZING NOT ADVISABLE.

Continuous grazing, however, is not generally regarded as the best method of using a field, and nearly all growers find it more profitable to make a few cuttings for hay and then graze during the rest of the year. When allowed to make hay, more or less seed is matured and scattered over the ground, and runners are formed which make new plants. During the grazing period few stems or seeds are produced, and the growth is heavier during the following months. Where haymaking and grazing are alternated it is a common practice to make hay during the warmer months and to graze during the cooler season; in fact, few fields are used exclusively for either hay or pasture. Even where grazing is the main object and the field is given what live stock it can carry during the 8 or 10 months of warm weather, there are occasional times of unusually favorable weather when all the grass can not be consumed by the animals available and one or two cuttings may be made for hay. Where hay is the principal object, it is usual to graze a few animals, one or two per acre, in the same field. While Rhodes grass makes excellent pasture for hogs, it should not be grazed too heavily by them, as so many of the runners will be torn loose that the grass will not be able to renew itself as completely as is desirable.

When the pastures begin to fail they can be renovated easily by a thorough disking and an application of some nitrogenous fertilizer.

### SEED SAVING.

Nearly all the Rhodes grass seed which is harvested in this country is gathered from about baling presses, barn floors, and other places where the hay has been handled. As the seeds are produced and ripened continuously through the entire growing season, the crop can not well be cut and thrashed like timothy, nor can it be gathered profitably by stripping, as bluegrass seed is gathered; but there are a few devices used by which a considerable quantity of the seed is

saved at a very small expense, and so far as quality is concerned it is fully as good as that which is imported. The simplest device is to spread a tarpaulin over the wagon frame when the hay is hauled from the field. In handling the hay the ripest and best seeds shatter from the heads most easily, and so the seeds saved in that way are usually of high quality.

Another device which is used to some extent consists of a framework about 10 feet wide and 20 feet long covered with heavy quarter-inch wire netting. This frame has several crosspieces to support the netting and is elevated about a foot above the ground. When in use it is placed between the stack and the baling press, and as the hay is pitched on to it from the stack it is beaten by the forks in the hands of the men who are passing it along to the baler, and the seed drops through the netting to the ground below. Not all of the seeds

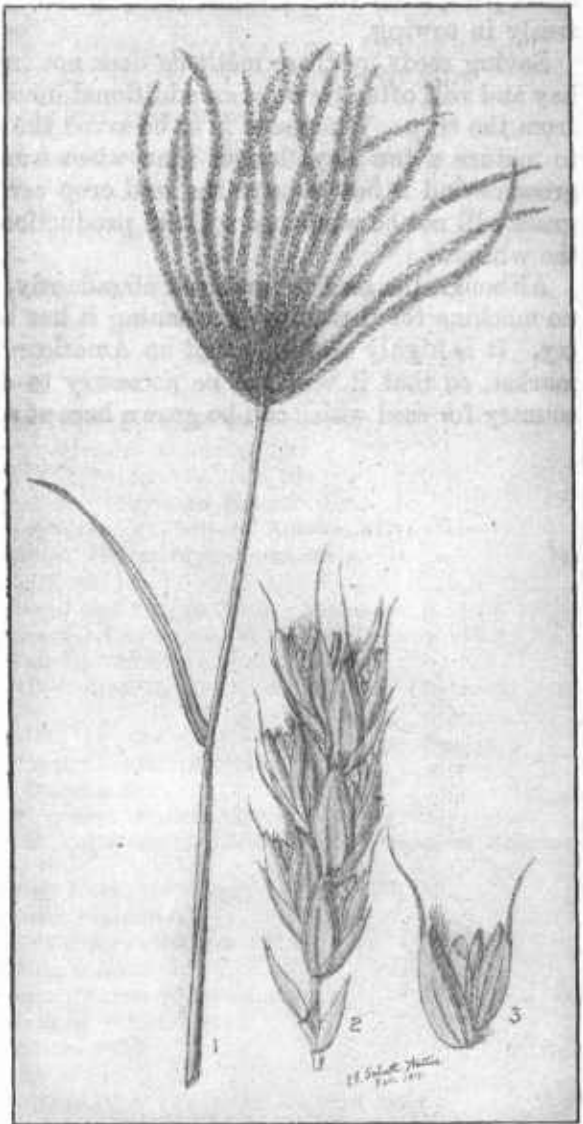


FIG. 3.—Rhodes grass : 1. Head ; 2, enlarged spike ; 3, spikelet.

are secured by any means, but enough can be saved to form an important item in making up the total value of the crop. When saved in that way the yield of seed depends largely on the thoroughness with which the hay is beaten while passing over the netting, but

from 25 to 50 pounds per ton are procured easily from fairly mature hay. The seed saved by either of these methods is mixed with a considerable quantity of chaff and trash and therefore has fewer good seeds per pound than cleaned seed, so that it should be used more freely in sowing.

Saving seeds by these methods does not injure the quality of the hay and will often produce an additional income of \$25 to \$50 an acre from the crop. When seed is to be saved the crop is usually allowed to mature a few days longer than when wanted for hay only, and growers find it best to save the seed crop early in the season, so the grass will not be weakened by seed production just before going into the winter.

Although the seed is produced abundantly, up to the present time no machine for thrashing or cleaning it has been made in this country. It is highly desirable that an American machine be put on the market, so that it will not be necessary to depend on any foreign country for seed which can be grown here at a good profit. (Fig. 3.)

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